

AL SUMELAT  
WATER NETWORK  
VILLAGE OF AL SUMELAT, IRAQ



**SIGIR PA-05-004**  
**MARCH 15, 2006**

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# Special Inspector General for Iraq Reconstruction

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## Al Sumelat Water Network Village of Al Sumelat, Iraq Synopsis

**Introduction.** This report was previously provided on a limited distribution basis only in Iraq to representatives of the Gulf Region Division of the U.S. Army Corps of Engineers and the Project and Contracting Office. In accordance with the revised policy of the Office of the Special Inspector General for Iraq Reconstruction, all project assessment reports are being issued publicly.

This project assessment was initiated as part of our continuing assessments of selected sector reconstruction activities for electricity, oil, and public works and water. The overall objectives were to determine whether selected sector reconstruction contractors complied with the terms of their contracts or task orders and to evaluate the effectiveness of the monitoring and controls exercised by administrative quality assurance and contract officers. This project assessment was conducted in accordance with the Quality Standards for Inspections issued by the President's Council on Integrity and Efficiency. The assessment team included a professional engineer and an auditor.

**Project Assessment Objectives.** The objective of this project assessment was to provide real-time relief and reconstruction project information to interested parties in order to enable appropriate action, when warranted. Specifically, we determined whether:

1. Project results will be consistent with original objectives;
2. Project components were adequately designed prior to construction or installation;
3. Construction or rehabilitation met the standards of the design; and
4. The contractor's quality control plan and the U.S. Government's quality assurance program were adequate.

**Conclusions.** This project assessment determined that:

1. The project objective of installation of a 8830 meter (m) potable water pipeline from an existing water main to the Village of Sumelat, with isolation valves and "tee" connections, in order to supply water to the Village of Al Sumelat was not being met because of deficiencies in quality control, quality assurance, and design, as well as instances in which work performed was inconsistent with the contract specifications.
2. The contractor's design was inconsistent with the requirements of the contract and inadequate for the project. The pipeline route and location of valves and tees were not adequately identified. In addition, design of the pipeline route under structures, such as railroad tracks, roadways, and irrigation canals was incomplete.
3. Installed sections of the pipeline were not in compliance with the requirements of the contract. Sand base material was not used in the placement of the pipeline, compacting and final grading was not completed, pressure testing had not been

accomplished on any section of the pipeline, and the pipeline was routed around curves without the use of elbow fittings. Additionally, the pipeline was in three unusable segments.

4. The contractor had not submitted a quality control plan for this project as required by the contract. The lack of a quality control plan can be directly linked to construction not being completed to the specifications of the contract.

**Recommendations and Management Comments.** We discussed the results of this project assessment with U.S. Army Corps of Engineers officials. Management concurred with our conclusions. Management formal comments were not requested. Formal recommendations to address the issues identified in this project assessment will be included in a summary report.

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# **Introduction**

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## **Objective of the Project Assessment**

The objective of this project assessment was to provide real-time relief and reconstruction project information to interested parties in order to enable appropriate action, when warranted. Specifically, we determined whether:

1. Project results will be consistent with original objectives;
2. Project components were adequately designed prior to construction or installation;
3. Construction or rehabilitation met the standards of the design; and
4. The contractor's quality control plan and the U.S. Government's quality assurance program are adequate.

## **Background**

### **Contract, Task Order, and Costs**

The Al Sumelat Water Supply Project is funded through the U.S. Government's appropriated Iraq Relief and Reconstruction Fund (IRRF) and administered through the Public Works and Water Sector of the Project Contracting Office (PCO). The contract file maintained by the Gulf Region Division - Central District (GRC) of the U.S. Army Corps of Engineers (USACE), showed that this project was being completed under Contract Number W917BG-05-P-0007. Contract Number W917BG-05-P-0007, awarded on February 9, 2005, is a competitively bid, design/build, firm fixed contract between GRC and SIMA International for \$763,650. This contract is for the design and construction of an 8830 linear meter (LM) 250-millimeter (mm) and 160 millimeter diameter Unplasticised Polyvinyl Chloride (UPVC) pipeline for the Al Sumelat Water Network.

GRC gave SIMA International notice to proceed on February 9, 2005. The contract was modified on May 10, 2005, because 225 millimeter UPVC pipe was used instead of 250 millimeter pipe as required by the Statement of Work (SOW). This modification reduced the amount of the contract from \$763,650 to \$743,650.

The GRC contracting office had made two interim payments to SIMA International at the time of our project assessment. The initial progress payment was approved by GRC on May 10, 2005, for 35% completion of work for \$267,277 and the second progress payment was approved on May 23, 2005, for 72% completion of work for \$282,550. In total, \$549,828 had been paid to SIMA International by the GRC contracting office at the time of our project assessment.

## **Project Objective**

According to the Statement of Work (SOW) and the USACE project engineer, the objective of this project was to design and construct a potable water pipeline from an existing water main located on the old Falluja-to-Baghdad Road to the Village of Al Sumelat. The project does not include connecting water to individual residences or businesses, which is the responsibility of the Iraqi local water directorate. At the time of the contract and of our project assessment, the Village of Sumelat did not have potable water available. The project included installation of an 8,830 meter potable water pipeline from an existing water main to the Village of Sumelat, with isolation valves and “tee” connections.

## **Description of the Project Location and Existing System**

Information in the January 29, 2005, revised SOW and discussions with the USACE project engineer indicated that there was no potable water pipeline servicing the Village of Al Sumelat at the time of the revised SOW or our project assessment. An existing and operational 1200 millimeter (48 inch) potable water main follows the Old Falluja-to-Baghdad Highway and is approximately 8000 meters (or about 5 miles) from the Village of Al Sumelat. The project was to connect a new 250 millimeter (10 inch) UPVC water pipeline to the existing 1200 millimeter water main. The new pipeline was to be placed adjacent to existing roads, under roadways, railroad tracks, and irrigation canals and through open agricultural fields. The topography of this area had minimal changes in elevation.

## **Scope of Work of the Task Order**

As indicated in the GRC contract file, the modified SOW for the Al Sumelat Water Network included the following major components of work:

- Connect new 250 millimeter diameter UPVC pipeline to the existing 1200 millimeter water main.
- Supply and install 6000 LM of 250 millimeter diameter UPVC pipe and fittings.
- Supply and install 2160 LM of 225 millimeter (8 inch) diameter UPVC pipe and fittings.
- Supply and install 670 LM of 160 millimeter (6 inch) diameter UPVC pipe and fittings.
- Supply and install 5 “tee” connections, which include manholes and thrust blocks.
- Supply and install 10 isolation valves, which include manholes and thrust blocks.

## **Project Work Reported to be Completed and Pending**

We determined the status of work at the Al Sumelat Water Network prior to the site visit through discussions with the USACE quality assurance representative and USACE project engineer, and a review of the contractor quality control reports, USACE quality assurance reports and GRC contract file.

- The June 18, 2005, contractor quality control report showed this project to be 100% complete.
- The July 3, 2005 PCO excel reports booklet for the Public Works and Water sector showed this project to be 100% physical complete, with an actual finish date of June 16, 2005.
- The USACE project engineer and quality assurance representative initially stated during interviews that this project was 97% complete.
- The USACE quality assurance representative stated later during his interview that the new 250 millimeter diameter line had been connected to the existing 1200 millimeter water main, but the pipeline was only partially completed. Isolation valves, “tee” connections, and manholes had not been installed, and there was a 500-meter gap in the pipeline. He said that a sand base for the pipeline was not installed and compaction of backfilled soil was not accomplished. He also said that no testing of the line had been conducted, that it would be performed when the entire project was completed.

The contractor quality control reports, USACE quality assurance reports, and results of interviews with the USACE project engineer and quality assurance representative were inconsistent.

Project site work reported completed, after interviews conducted:

- Connected new 250 millimeter diameter UPVC pipeline to existing 1200 millimeter water main.
- Supplied and installed 6000 LM of 250 millimeter diameter UPVC pipe and fittings.
- Supplied and installed 1660 LM of 225 millimeter diameter UPVC pipe and fittings.
- Supplied and installed 670 LM of 160 millimeter diameter UPVC pipe and fittings.

No project site work was reported to be in progress.

Project site work reported not yet underway:

- Supply and install 5 “tee” connections, which includes manholes and thrust blocks.
- Supply and install 10 isolation valves, which includes manholes and thrust blocks.
- Supply and install 500 LM of 225 millimeter diameter UPVC pipe and fittings.

## Site Assessment

On July 3, 2005, our assessment team, which included a professional engineer and an auditor, performed an on-site assessment of the Al Sumelat Water Network project. The on-site assessment included a visual check of over 92% of the pipeline route. It assessed completed and pending work. No work was observed in progress during the site assessment. Figure 1 shows the general pipeline layout including reference points. The

length of the pipeline legs reported are approximate and based on a USACE provided pipeline route map.

### **Work Completed**

Connect new 250 mm diameter UPVC pipeline to existing 1200 mm water main

The contract required connecting the new 250 millimeter diameter UPVC pipeline to the existing 1200 millimeter water main. Observations during the site visit could not verify the new connection had been completed. An open excavation was found at the location of the connection (Figure 1, point A). The excavated pit was filled with water (Site photo 1) and piping could not be located beneath the water.

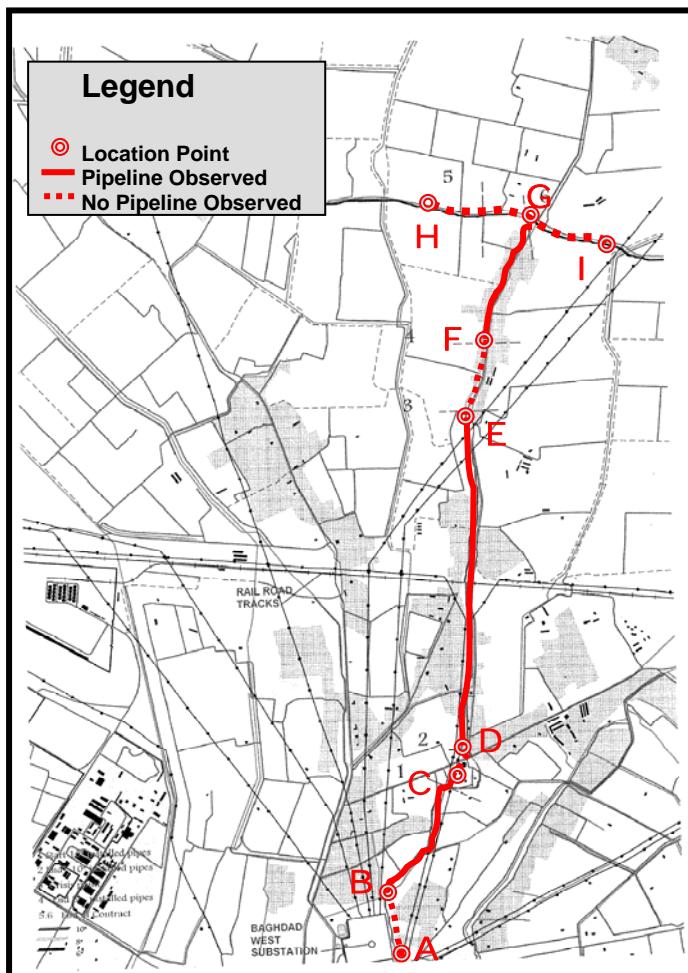


Figure 1: Al Sumelat Pipeline Location Map



**Site Photo 1: Pipeline point A, showing recent excavation**

Supply and install 6,000 LM of 250 millimeter diameter UPVC pipe, 1,660 LM of 225 millimeter diameter UPVC pipe, and 670 LM of 160 millimeter diameter UPVC pipe and fittings

The contract and design specifications required the supply and installation of approximately 6000 LM of 250 millimeter diameter UPVC pipe, 2160 LM (1660 reported complete) of 225 millimeter diameter UPVC pipe, and 670 LM of 160 millimeter diameter UPVC pipe and fittings. This work required the excavation of a trench, placement of a sand base, installation of the pipe and fittings, backfilling, pressure testing, compacting, and final grading.

**Point A to B:** The approximate length of the pipeline from point A to point B (see the locator map in Figure 1 on page 4) is 840 meters. Disturbed soil leading in the direction of the pipeline route was observed from point A. The disturbed soil appeared to be the result of a recent trench excavation and subsequent backfilling of the trench (Site photo 2). It could not be determined how far this excavation continued. The starting point of the pipeline was not visibly protruding from the disturbed soils and could not be located at point A. An observation at point B leading back toward point A along the proposed pipeline path was of an open field showing no recently disturbed soil (Site photo 3). Consequently, no evidence that the pipeline had been installed between points A and B was found.



Site photo 2: Pipeline point A, leading to point B



Site photo 3: Pipeline point B, leading back to point A

**Point B:** Point B on the locator map in Figure 1 on page 4 is the point at which the pipeline route crosses underneath an irrigation canal. A recently excavated tunnel approximately 1 meter by 1/2 meter was observed underneath the irrigation canal. The pipeline was not visible leading into (Site photo 4) or exiting the

tunnel. The bottom of the tunnel excavation appeared to be undisturbed soil. Consequently, no evidence that the pipeline had been installed beneath the irrigation canal was found.



**Site photo 4: Point B excavated tunnel under irrigation canal**

**Point B to C:** The approximate length of the pipeline from point B to point C (see the locator map in Figure 1 on page 4) is 1,495 meters. Uncapped endpoints of the pipeline were observed at both points B and C (Site photos 5 & 6). The pipe diameter looked to be approximately 225 millimeters, but accurate measurements were not obtained at this location. Disturbed surface soil was observed continuously between points B and C along the proposed pipeline route. The disturbed soil appeared to be the result of a recent trench excavation and subsequent backfilling of the trench. A sand base was not present at the endpoints of the pipeline. A significant amount of unconsolidated soil was observed above grade along the pipeline path. Lack of compacting during backfilling operations would result in the presence of the observed excess soil. The surface of the disturbed soil was uneven with several feet variation in height along the pipeline route. This indicates that final surface grading was not completed. It appeared, based on site assessment observations, that the pipeline had been installed between points B and C, but the pipeline installation was not consistent with contract requirements.



Site photo 5: Uncapped submerged pipe end at point B



Site photo 6: Uncapped pipe end at point C

**Point C to D:** The approximate length of the pipeline from point C to point D (see the locator map in Figure 1 on page 4) is 110 meters. The pipeline route crosses a road intersection at this location. A recently excavated tunnel approximately 1 meter by  $\frac{1}{2}$  meter was observed beneath the road intersection.

The pipeline was not visible and could not be located leading into or exiting the tunnel. The bottom of the tunnel excavation appeared to be undisturbed soil. Consequently, no evidence that the pipeline had been installed beneath the road between points C and D was found.

**Point D to E:** The pipeline leg from point D to point E (see the locator map in Figure 1 on page 4) is approximately 3,389 meters in length. This section parallels the road and crosses underneath a set of railroad tracks. The endpoint could not be located at point D and an uncapped endpoint of 225 millimeter diameter pipeline was observed at point E. Disturbed surface soil was observed continuously between points D and E along the proposed pipeline route. The disturbed soil appeared to be the result of a recent trench excavation and subsequent backfilling of the trench. A sand base was not present at the endpoints of the pipeline. A significant amount of unconsolidated soil was observed above grade along the pipeline path. Lack of compacting during backfilling operations would result in the presence of the excess soil. The surface of the disturbed soil was uneven with several feet variation in height along the pipeline route. This demonstrates final surface grading was not completed. It appeared, based on site assessment observations, that the pipeline had been installed between points D and E, but the pipeline installation was not consistent with contract requirements.

**Point E to F:** The pipeline leg from point E to point F (see the locator map in Figure 1 on page 4) is approximately 703 meters in length. This section parallels and crosses under the roadway. A recently dug open trench approximately 1 meter in depth was observed along the proposed pipeline route. Pipe was not visible and the bottom of the trench excavation appeared to be undisturbed soil. At the location where the proposed pipeline route crosses underneath the road a recently excavated tunnel, approximately 1 meter by ½ meter was observed. The pipeline was not visible and could not be located leading into or exiting the tunnel. The bottom of the tunnel excavation appeared to be undisturbed soil. Consequently, no evidence that the pipeline had been installed between points E and F was found. Prior to the site visit, this section of the pipeline was identified as not being completed by the USACE Quality Assurance Representative and is listed in this report under the section on “Work Pending.”

**Point F to G:** The pipeline leg from point F to point G (see the locator map in Figure 1 on page 4) is approximately 1,315 meters in length. Uncapped endpoints of a 225 millimeter pipeline were seen at both point F and point G. A short section of the pipeline trench, which was only partially backfilled, clearly indicated that sand base was not used (Site photo 7). Disturbed surface soil was observed along the remainder of the proposed pipeline between point F and G. The disturbed soil appeared to be the result of a recent trench excavation and subsequent backfilling of the trench. A significant amount of unconsolidated soil was observed above grade along the pipeline path. Lack of compacting during backfilling operations would result in the presence of the observed excess soil. The surface of the disturbed soil was uneven with several feet variation in height

along the pipeline route. This demonstrates final surface grading was not completed.

The pipeline near point G was observed to be routed around a bend without the use of an elbow fitting (Site photo 8), creating a 13 millimeter ( $\frac{1}{2}$  inch) gap in the pipe connection (Site photo 9). It appeared, based on site assessment observations, that the pipeline had been installed between point F and point G, but the pipeline installation was not consistent with contract requirements.



**Site photo 7: 225 millimeter pipeline in partially back filled trench**



**Site photo 8: Bend in pipe**



**Site photo 9:  $\frac{1}{2}$  inch (13 millimeter) gap in pipeline joint**

**Point H to I:** The pipeline leg from point H to point I (see the locator map in Figure 1 on page 4) is approximately 2,571 meters in length. A recently dug open trench approximately 1 meter in depth was observed along the proposed pipeline route. Pipe was not visible and the bottom of the trench excavation appeared to be undisturbed soil. Consequently, no evidence that the pipeline had been installed between points H and I was found.

**Point A to I (entire pipeline summary):** The estimated total length of recent trench excavations is 9,583 meters. The estimated total length of installed 225 millimeter diameter pipeline is 6,199 meters. Installation of 250 millimeter diameter and 160 millimeter diameter pipe was not observed at any location during the site assessment. A sand base was not observed at any location, and compaction and final grading was not accomplished during the installation of the pipeline. There was evidence that 6,199 meters of 225 millimeter diameter pipe had been installed, but the entire pipeline installation was not consistent with contract requirements.

### **Work In Progress**

No work was in progress at the time of our site assessment on July 3, 2005. The contractor was not on site during the site assessment. The only equipment observed near the site was a backhoe located adjacent to the open trench excavation near point I, in Figure 1 on page 4. Materials required for the completion of the project were not observed anywhere along the proposed pipeline route.

## **Work Pending**

Supply and install 5 “tee” connections, which include manholes and thrust blocks.

During the site assessment, approximately 92% of the pipeline route was assessed. Neither “tee” connections nor associated manholes were observed at any location along the pipeline route.

Supply and install 10 isolation valves, which include manholes and thrust blocks.

During the site assessment, approximately 92% of the pipeline route was assessed. Neither isolation valves nor associated manholes were observed anywhere along the pipeline route.

Supply and install 500 LM of 225 millimeter diameter UPVC pipe and fittings.

**Point E to F:** The pipeline leg from point E to point F (see the locator map in Figure 1 on page 4) is approximately 703 meters in length. This section parallels and crosses under the roadway. A recently dug open trench approximately 1 meter in depth was observed along the proposed pipeline route. The pipeline was not visible and the bottom of the trench excavation appeared to be undisturbed soil. At the location where the proposed pipeline route crossed underneath the road a recently excavated tunnel, approximately 1 meter by  $\frac{1}{2}$  meter was observed. The pipeline was not visible and could not be located leading into or exiting the tunnel. The bottom of the tunnel excavation appeared to be undisturbed soil. Consequently, no evidence that a pipeline had been installed between points E and F was found.

## **Conclusions**

Reviews of contract documentation, the design package, and quality assurance documentation, as well as interviews with key project personnel and the site visit, led to the following conclusions for each of the stated Project Assessment objectives.

1. Determine whether project results will be consistent with original objectives.

The project objectives of installation of an 8,830 meter potable water pipeline from an existing water main to the Village of Sumelat, with isolation valves and “tee” connections in order to supply water to the Village of Al Sumelat, were not being met because of deficiencies in quality control, quality assurance, and design, as well as instances in which work performed was inconsistent with the contract specifications.

2. Determine whether project components were adequately designed prior to construction or installation.

The contractor’s design was inconsistent with the requirements of the contract and inadequate for the project. The pipeline route and location of valves and “tees” were not adequately identified. In addition, design of the pipeline route under structures such as railroads tracks, roadways, and irrigation canals was incomplete.

3. Determine whether construction or rehabilitation met the standards of the design.

Installed sections of the pipeline were not in compliance with the requirements of the contract. Sand base material was not used in the construction of the pipeline, compacting and final grading was not completed, pressure testing had not been accomplished on any section of the pipeline, and the pipeline was curved without the use of elbow fittings. Additionally, the pipeline was in three unusable segments.

4. Determine whether the contractor's quality control plan and the Government quality assurance program were adequate.

The contractor had not submitted a quality control plan for this project as required by the contract. The lack of a quality control plan can be directly linked to construction not being completed to the specifications of the contract.

**Recommendations and Management Comments.** We discussed the results of this project assessment with U.S. Army Corps of Engineers officials. Management concurred with our conclusions. Management formal comments were not requested. Formal recommendations to address the issues identified in this project assessment will be included in a summary report.

## **Appendix A. Scope and Methodology**

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We performed this project assessment from June through July 2005 in accordance with the Quality Standards for Inspections issued by the President's Council on Integrity and Efficiency. The assessment team included a professional engineer, an auditor, and a special agent.

In performing this Project Assessment we:

- Reviewed contract documentation to include the Independent Government Estimate, Scope of Work, Contract, and contract modifications;
- Reviewed the design package (drawings and specifications), Quality Assurance Plan, Quality Control Plan, and quality control and assurance reports;
- Interviewed the Contracting Officer, Project Manager, Project Engineer, and Quality assurance representative; and
- Conducted an on-site assessment of the Al Sumelat Water Network.

## **Appendix B. Acronyms**

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CPA	Coalition Provisional Authority
GRC	Gulf Region Division – Central District of the U.S. Army Corps of Engineers
LM	Linear Meter
m	Meter
mm	Millimeter
PCO	Project and Contracting Office
PE	Professional Engineer
SIGIR	Special Inspector General for Iraq Reconstruction
SOW	Statement of Work
UPVC	Unplasticised Polyvinyl Chloride
USACE	U.S. Army Corps of Engineers

## **Appendix C. Assessment Team Members**

The Office of the Assistant Inspector General for Inspections, Office of the Special Inspector General for Iraq Reconstruction, prepared this report. The principal staff members who contributed to the report include:

Jon Novak

Michael Stanka, P.E.

William Whitehead

Lloyd Wilson